Coercion

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As a matter of convenience to the programmer, many programming languages provide a mechanism for automatically converting from one data type to another in expressions. This automatic type conversion is called *coercion*.

A familiar example of coercion occurs in arithmetic expressions containing both integer and floating point operands, as in $K + 3.5$, where K is of type integer. The integer variable K is first automatically converted to floating point, and then the addition is performed in floating point mode. If the language does not have such a coercion, the programmer must make the conversion explicit (e.g. FLOAT $(K) + 3.5$).

The kind of coercion that must be applied to an operand depends on the type of that operand, as well as on the type of operand required by the context. As an illustration, consider the expression $X + K$, where K is again of type integer. If X is also of type integer, no coercion need be performed; if X is of type floating point or complex, K must be coerced to the same type as X before the addition can be performed. Note that a language may not simultaneously provide coercions from type A to type B and also from type B to type A, since expressions of the form $A + B$ would then be ambiguous.

Coercions are not restricted to converting between integer, floating point, and complex. In Snobol4 and AWK, for example, an expression such as $K + '01.50'$ is permitted, since '01.50' may be coerced from type string to type

floating point. Other common coercions are from decimal to binary (PL/I), and scalar to array (APL).

The term coercion was first used in this context Algol 68 (*q.v.*). In the revised Algol 68 report, there are six coercions—*widening* (e.g. integer to floating point), *rowing* (e.g. character to string), *deproceduring* (calling an argumentless function, e.g coercing a **proc real** to a **real**), *dereferencing* (converting a variable to its value), *uniting* (used to assign values to variables that accept several types), and *voiding* (used for discarding superfluous values).

Coercion is also used in other languages to describe the assignment of an expression of one mode to a variable of another. There is, of course, little difference between coercing as described above and then assigning or coercing *while* assigning.

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